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EXAMINER	
TURK, NEIL N	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.**	**Applicant(s)**	
	10/815,336	LIU, JAMES Z.	
	Examiner	**Art Unit**	
	NEIL TURK	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9,13-16,18,19 and 21-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9,13-16,18,19 and 21-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Remarks

This Office Action fully acknowledges Applicant's remarks filed on February 20th, 2008. Claims 1-7, 9, 13-16, 18, 19, and 21-23 are pending. Claims 8, 10-12, 17, 20, and 24-26 (cancelled in this response) have been cancelled.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 20th, 2008 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation is unclear and confusing. What is meant by the recitation? It is unclear what further limiting structure is being recited with respect to the differing sensing films by the recitation given in claims 2 and 16. Further,

the recitation appears to be drawn to an implicitly recited function of the differing sensing film. Applicant has not further limited the structure or composition of the sensing film in the recitation that follows "such that" above. The recitation also appears drawn to a method of making the sensing film, which is not afforded patentable weight within device claims. Examiner asserts that claims 2 and 16 merely recite that the differing sensing film[s] comprise~~s~~ sensing film materials and nothing more.

Examiner further notes that the beginning of the recitation, i.e. "...said differing sensing film comprises sensing film materials..." should parallel the plural differing sensing films or use language drawn to "each" to clearly state such differing sensing films. As currently recited, "said differing sensing film" is incorrect as a plurality have been claimed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-7, 9, 15, 16, 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. (5,235,235), hereafter Martin, in view of Frye et al. (5,076,094), hereafter Fry '094, and in view of Neuberger (5,065,140).

Martin discloses multiple-frequency acoustic wave devices for chemical sensing in both gas and liquid phase (abstract). Martin discloses that acoustic wave devices function as highly sensitive detectors of changes in surface mass, and specific sensors are achieved by securing a film capable of immobilizing a particular species from the environment to the interaction region of the device (lines 20-39, col. 1). Martin discloses a sensor 1 that includes two or more pairs of interdigital electrodes or transducers (IDTs) 10 having different periodicities. Martin discloses that each IDT is comprised of first and second electrodes 10a, 10b, and the IDTs are patterned on a piezoelectric substrate 12. Martin discloses that each pair of IDTs may launch and receive various Aws, including surface acoustic wave (SAW), also known as a Rayleigh wave, as well as several acoustic plate modes (APMs). Martin discloses that SAW is typically chosen for gas-phase and materials-characterization applications, while shear horizontal APM (SH-APM) is chosen for liquid-phase applications. Martin shows in figures 3 and 4 the electronic test and measurement circuitry used to launch, receive, and monitor the propagation characteristics (lines 30-67, col. 4, figs. 1-4). Martin discloses an electronic apparatus 40 for measuring changes in AW velocity and attenuation at multiple frequencies. Martin discloses pairs of output IDTs 10 are connected into a feedback

loop of an associated amplifier network 42, each functioning as a separate free-running oscillator circuit. Martin further discloses that an associated frequency counter 46, which is under the control of computer 30, detects the frequency of oscillation of each oscillator circuit (lines 6-67, col. 6, figs. 3&4). Examiner asserts that any of the frequency counters 46 communicate with the plurality of oscillators such that all the oscillators and frequency counters are connected within the same circuitry. Martin further discloses an example of a fabricated device in which the interdigital transducers were defined using an etching process from Au-on-Cr metallization (lines 15-57, col. 5). With respect to the various outputs of data recited in the claims Examiner asserts that Applicant has not established further structure to the device with respect to outputting the different modes, and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

If the disclosure to specific sensors achieved by securing a film capable of immobilizing a particular species from the environment to the interaction region of the device and the various interaction regions 13 disclosed by Martin are not taken to read as sensing regions with differing sensing films, then it would have been obvious to modify Martin as taught by Frye '094.

Frye '094 discloses a dual-output acoustic wave sensor for molecular identification. Frye '094 discloses that acoustic wave chemical sensors utilize a thin film coating which sorbs or binds the chemical species to be detected and when the sorption/binding is selective for the chemical species of interest, a selective chemical

sensor is obtained. Frye '094 further discloses that because this selectivity is far from perfect, an array of sensors with different coatings is used (lines 33-41, col. 6).

It would have been obvious to modify Martin to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor.

Martin and Frye '094 do not disclose a single frequency counter that communicates with the plurality of oscillators. Martin does not disclose that each of the sensing components comprise a quartz crystal.

Neuburger discloses a gas detection system in which multiple microbalance detectors 122 comprising quartz crystal oscillators are used and the rate of change of crystal oscillation frequency is monitored by a frequency counter 130 under the control of a processor 112 (abstract, columns 2&3, fig. 1).

It would have been obvious to modify the modified Martin device to use quartz crystal as sensing devices (to which the thin film coating would be applied as taught by Frye '094) such as taught by Neuburger as quartz crystal is a known alternative sensing component for use in producing oscillation frequencies that may be measured and monitored by a frequency counter for gas-phase detection applications.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of Frye and Neuburger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 and in further view of Desu et al. (5,527,567).

Martin in view of Frye ‘094 and Neuburger does not specifically disclose that the sensing components comprise electrode materials chosen from among the group comprising at least one of TiN, CoSi2, and WC.

Desu discloses high quality layered structure oxide ferroelectric thin films which are useful in the applications of piezoelectric transducers and surface acoustic wave devices (lines 33-43, col. 4). Desu discloses that a thin bottom layer electrode is deposited on top of the substrate, and may be a conductive nitride such as TiN (lines 10-27, col. 6).

It would have been obvious to modify the modified device of Martin to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device.

Claims 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of Frye ‘094 and Neuberger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 and in further view of Ueda et al. (6,037,847), hereafter Ueda.

Martin/Frye ‘094/Neuberger does not specifically disclose that the sensing components comprise electrode materials chosen from among NiCr and CuAl.

Ueda discloses a surface acoustic wave device in which an interdigital electrode of an AlCu alloy is used with an Y-X cut of a $LiTaO_3$ (abstract; lines 7-17, col. 2).

It would have been obvious to modify Martin/Frye’094/Neuberger to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to

provide a known electrode material for a SAW device (for both surface and leaky surface acoustic waves).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of Frye '094 and Neuberger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 above and in further view of Pfeifer et al. (5,795,993), hereafter Pfeifer '993.

Martin/Frye '094/Neuberger does not specifically disclose a piezoelectric material among a group comprising at least one of: a-quartz, lithium niobate, lithium tantalite, Li2B4O7, GaPO4, langasite, ZnO, and epitaxially grown nitrides including Al, Ga, or In.

Pfeifer '993 discloses an acoustic-wave sensor. Pfeifer '993 discloses that the acoustic-wave sensor comprises an acoustic-wave device such as a SAW device, a flexural-plate-wave (FPW) device, an acoustic-plate-mode (APM) device, or a thickness-shear-mode (TSM) (also known as quartz crystal microbalance or QCM) device having a sensing region. Pfeifer '993 discloses that the sensing region includes a sensing film for sorbing a quantity of the photoresist-stripping agent, thereby altering or shifting a frequency of oscillation of an acoustic wave. Pfeifer '993 also discloses that in a preferred embodiment of the invention the acoustic-wave device is a SAW device and the sensing film comprises poly(vinylacetate), poly(N-vinylpyrrolidinone), or poly(vinylphenol) (abstract). Pfeifer '993 discloses that an acoustic-wave sensor 10 comprises an acoustic-wave device 12 having a sensing region 14 including the photoresist-stripping agent sensing film 16 on the surface for sorbing (lines 35-67, col. 3, fig. 1). Pfeifer '993 discloses gas-phase applications utilize a SAW, while other

applications utilize FPW, APM, or TSM(QCM) devices. Pfeifer '993 also discloses that while only a single acoustic-wave device 12 is shown in figure 1, one or more additional acoustic-wave devices may be used for the acoustic-wave sensor to detect a plurality of different agents, or to provide a reference for accurately determining the frequency shift and to compensate for environmental factors including temperature and humidity (lines 1-18, col. 4, fig. 1). Pfeifer '993 discloses that the SAW device has a substrate made of piezoelectric material, such as lithium niobate, crystalline quartz, lithium tantalite, or the like (lines 18-24, col. 4). Pfeifer '993 discloses that electrical means 20 are connected to the device for generating an acoustic wave and includes an amplifying means 26 for receiving a detected signal. Pfeifer '993 discloses that by locating the acoustic-wave sensor in a feedback loop of the amplifying means, a free-running oscillator is formed with the frequency of oscillation changing slightly with the amount of PSA sorbed on or desorbed from the sensing film. Pfeifer '993 further discloses that the frequency detection means 28 is a frequency counter, and may include a reference means (e.g. a second free-running oscillator comprising a second acoustic-wave device connected in a feedback loop of a second amplifier) (lines 20-52, col. 6, fig. 1). Pfeifer '993 further discloses that in another embodiment the electrical means 20 comprises amplifying means 26 connected across each of the acoustic wave and SAW devices, with each SAW device forming a free-running oscillator (lines 43-67, col. 7). With respect to the various outputs of data recited in the claims, Examiner asserts that Applicant has not established further structure to the device with respect to outputting the different modes,

and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

It would have been obvious to modify Martin/Frye '094/Neuberger to include lithium niobate, crystalline quartz, or lithium tantalate as a piezoelectric material such as taught by Pfeifer '993 in order to provide a known piezoelectric material for use in surface acoustic wave sensors.

Claims 1-7, 9, 15, 16, 18, 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer et al. (5,571,944), hereafter Pfeifer '944, in view of Frye'094.

Pfeifer '944 discloses an acoustic wave based moisture sensor that includes a detector 110 and reference 120 SAW device that are used as feedback elements in oscillator circuits. Pfeifer '944 also discloses sensing film 12 and reference film 14, as well as RF amplifiers 115 and 125 connected across respective transducer pairs 114 and 124, and a frequency counter 18 connected to detect the difference frequency between the two oscillator circuits (columns 3&4+, figs. 1,6, & 7). Pfeifer '944 further discloses that in addition to a SAW device, any acoustic wave device may be used in place of the SAW device, such as shear mode resonators (quartz crystal microbalances), acoustic plate mode devices, and flexural plate wave devices (lines 30-42, col. 7). With respect to the various outputs of data recited in the claims, Examiner asserts that Applicant has not established further structure to the device with respect to

outputting the different modes, and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

Pfeifer '944 does not disclose differing sensing films on the sensing regions.

Frye '094 has been discussed above.

It would have been obvious to modify Pfeifer '944 to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor.

Claims 1-7, 9, 15, 16, 18, 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '993, in view of Frye '094.

Pfeifer '993 discloses an acoustic-wave sensor. Pfeifer '993 discloses that the acoustic-wave sensor comprises an acoustic-wave device such as a SAW device, a flexural-plate-wave (FPW) device, an acoustic-plate-mode (APM) device, or a thickness-shear-mode (TSM) (also known as quartz crystal microbalance or QCM) device having a sensing region. Pfeifer '993 discloses that the sensing region includes a sensing film for sorbing a quantity of the photoresist-stripping agent, thereby altering or shifting a frequency of oscillation of an acoustic wave. Pfeifer '993 also discloses that in a preferred embodiment of the invention the acoustic-wave device is a SAW device and the sensing film comprises poly(vinylacetate), poly(N-vinylpyrrolidinone), or poly(vinylphenol) (abstract). Pfeifer '993 discloses that an acoustic-wave sensor 10 comprises an acoustic-wave device 12 having a sensing region 14 including the photoresist-stripping agent sensing film 16 on the surface for sorbing (lines 35-67, col. 3, fig. 1). Pfeifer '993 discloses gas-phase applications utilize a SAW, while other

applications utilize FPW, APM, or TSM(QCM) devices. Pfeifer '993 also discloses that while only a single acoustic-wave device 12 is shown in figure 1, one or more additional acoustic-wave devices may be used for the acoustic-wave sensor to detect a plurality of different agents, or to provide a reference for accurately determining the frequency shift and to compensate for environmental factors including temperature and humidity (lines 1-18, col. 4, fig. 1). Pfeifer '993 discloses that the SAW device has a substrate made of piezoelectric material, such as lithium niobate, crystalline quartz, lithium tantalite, or the like (lines 18-24, col. 4). Pfeifer '993 discloses that electrical means 20 are connected to the device for generating an acoustic wave and includes an amplifying means 26 for receiving a detected signal. Pfeifer '993 discloses that by locating the acoustic-wave sensor in a feedback loop of the amplifying means, a free-running oscillator is formed with the frequency of oscillation changing slightly with the amount of PSA sorbed on or desorbed from the sensing film. Pfeifer '993 further discloses that the frequency detection means 28 is a frequency counter, and may include a reference means (e.g. a second free-running oscillator comprising a second acoustic-wave device connected in a feedback loop of a second amplifier) (lines 20-52, col. 6, fig. 1). Pfeifer '993 further discloses that in another embodiment the electrical means 20 comprises amplifying means 26 connected across each of the acoustic wave and SAW devices, with each SAW device forming a free-running oscillator (lines 43-67, col. 7). With respect to the various outputs of data recited in the claims, Examiner asserts that Applicant has not established further structure to the device with respect to outputting the different modes,

and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

Pfeifer ‘993 discloses multiple acoustic-wave devices used for the acoustic-wave sensor as well as multiple sensing films, but does not specifically disclose differing sensing films on the sensing regions of the devices.

Frye ‘094 has been discussed above.

It would have been obvious to modify Pfeifer ‘993 to include differing sensing films such as taught by Frye ‘094 so as to provide a more selective AW sensor.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer ‘944 in view of Frye ‘094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Desu.

Pfeifer ‘944/Frye ‘094 does not specifically disclose that the sensing components comprise electrode materials chosen from among the group comprising at least one of TiN, $CoSi_2$, and WC.

Desu has been discussed above.

It would have been obvious to modify Pfeifer ‘944/Frye ‘094 to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '993 in view of Frye '094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Desu.

Pfeifer '993/Frye '094 does not specifically disclose that the sensing components comprise electrode materials chosen from among the group comprising at least one of TiN, CoSi2, and WC.

Desu has been discussed above.

It would have been obvious to modify Pfeifer '993/Frye '094 to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device.

Claims 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '944 in view of Frye '094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Ueda.

Pfeifer '944/Frye '094 does not specifically disclose that the sensing components comprise electrode materials chosen from among NiCr and CuAl.

Ueda has been discussed above

It would have been obvious to modify Pfiefer '944/Frye '094 to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide Pfiefer '944/Frye '094 with a known electrode material for a SAW device (for both surface and leaky surface acoustic waves).

Claims 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '993 in view of Frye '094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Ueda.

Pfeifer '993/Frye '094 does not specifically disclose that the sensing components comprise electrode materials chosen from among NiCr and CuAl.

Ueda has been discussed above

It would have been obvious to modify Pfiefer '993/Frye '094 to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide Pfiefer '993/Frye '094 with a known electrode material for a SAW device (for both surface and leaky surface acoustic waves).

Response to Arguments

Applicant's arguments **with respect to claims 1-7, 9, 13-15, 16, 18, 19, 21-26** rejected under 35 USC 102(b) as being anticipated by Martin (5,235,235) or, in the alternative, under 35 USC 103(a) as obvious over Martin in view of Frye (5,076,094), as well as further combinations of Martin in view of Frye '094, have been considered but are moot in view of the new ground(s) of rejection as discussed above.

Applicant's arguments filed February 20th, 2008 have been fully considered but they are not persuasive.

With regards to claims 1-4, 9, 15, 16, 18, 19, 21, and 23 rejected under 35 USC 103(a) as being unpatentable over Pfeifer '944 (5,571,944) in view of Frye '094, Applicant traverses the rejection.

Applicant argues that neither Pfeifer '944 nor Frye'094 teach a frequency counter under the command of a processor. Examiner argues that Pfeifer '944 teaches a frequency counter 18 that is electrically connected to RF amplifiers 115, 125 respectively connected across transducer pairs 114, 114 and then to RF mixer 16. Thereby, the frequency counter is under the command of such element as it detects difference in frequency between the two circuits as information is passed to it from such elements (column 4). Examiner further asserts that Pfeifer teaches further control to the frequency counter in that a data acquisition subsystem 650 collects frequency outputs and transmits it to the signal processing/system control substrem 660 and provides data output on gas and moisture concentrations (column 6). Examiner further asserts that as operation of the device is started, the frequency counter is thereby under the command of all the elements that lead to it producing a measurement. Applicant further argues that Pfeifer '944 does not disclose a plurality of quartz crystal sensing components, each of which is covered by a different sensing film. Examiner asserts that Pfeifer '944 discloses using a similar device in which quartz crystal microbalances are used (column 7), and the teachings of Frye '094 provide for including differing sensing films so as to provide a more selective sensor. Applicant further asserts that Pfeifer '944 operates under particular frequency ranges, and taking the sensing films from Frye '094 and combining these with Pfeifer '944 would like damage these operating frequency ranges,

rendering the device useless. Examiner argues that as Pfeifer '944 discloses the embodiment of a reference film and sensing film, wherein the difference in frequency is detected by frequency counter 18, the teachings of Frye '094 are provided to modify Pfeifer '944 to include multiple sets of such sensing film/reference film connections so as to increase the selectivity. Examiner asserts that this modification does not render the resulting device useless and does not damage any such operating frequency as a differential measurement is being made with respect to the sensing film/reference film pairs. Further, one of ordinary skill in the art would be able to look at Pfeifer '944 in view of Frye '094 and supply an array of such reference film/sensing film pairs and have an expectation of success for the combination given that only more parallel differential measurements are being made for a more selective sensor.

Applicant further argues that neither Pfeifer '944 or Frye '094 teach that the differing sensing film comprises sensing film materials such that said differing sensing film comprises desired response properties by mixing analyte molecules and said sensing film materials mixed in a solution in order to result a suitable formation of said sensing film based on an interaction force selected by affinity between said sensing film and said analyte, thereby achieving said sensing film with said desired response properties. As discussed above, such a recitation is unclear and indefinitely recited. Further, the recitation appears to be drawn to an implicitly recited function of the differing sensing film. Applicant has not further limited the structure or composition of the sensing film in the recitation that follows "such that" above. The recitation also appears drawn to a method of making the sensing film, which is not afforded patentable

weight within device claims. As such, the sensing films of the Pfeifer '944/Frye '094 are taken to read on such a recitation and it is also noted that such sensing films are provided for their selective binding to chemical species of interest, such that Pfeifer '944/Frye '094 form sensing films with desired response properties.

Applicant further argues that Pfeifer ‘944 and Frye '094 have not been identified for the various multiple modes frequency outputs. Examiner asserts that as Pfeifer ‘944discloses a SAW device as described above it is known that the device will produce such acoustic wave mode data as recited. Further, Examiner asserts that Applicant has not provided in the dependent claims which delineate such type of data any further structure that would specifically provide for outputting the respective types of data. As such, given that Pfeifer '944 in view of Frye '094 contain all the structural elements recited, the combination is also said to be capable of outputting such data as recited in the claims.

With regards to claims 1-4, 9, 15, 16, 18, 19, 21, and 23 rejected under 35 USC 103(a) as being unpatentable over Pfeifer (5,795,993), Pfeifer '993, in view of Frye '094, Applicant traverses the rejection.

Applicant argues that neither Pfeifer ‘993 nor Frye ‘094 teach a frequency counter under the command of a processor, or a plurality of quartz crystal sensing components each of which is covered by a different sensing film. Examiner further asserts that as operation of the device is started by the electrical means 20 for generating an acoustic wave, the frequency counter is thereby under the command of all the elements that lead to it producing a measurement. Examiner also argues that

Pfeifer '993 discloses a plurality of quartz sensing components as Pfeifer '993 discloses using a TSM (also known as quartz crystal microbalance, QCM) and further discloses that multiple such acoustic wave devices may be used (columns 3&4). Examiner further argues that the combination of Pfeifer '993 in view of Frye '094 provides for the quartz crystal sensor components with differing sensing films so as to provide for more selectivity.

Applicant further argues that the combination of Pfeifer '993/Frye '094 would damage the operating frequencies, thereby rendering the device useless. Examiner argues that the modification was not made for this reason and does not effect operating frequencies of Pfeifer '993. Examiner argues that a modification to add a plural amount of sensing devices is already disclosed as a possibility in Pfeifer '993 (lines 9-17, col. 4), and Frye '094 further discloses that an array with differing sensing films would provide increased selectivity to the device. Thereby the modification provides a reasonable expectation of success to one of ordinary skill in the art, as Pfeifer '993 discloses multiple devices being used (thereby multiple films) and Frye '094 further provides motivation for such an array to allow for more selectivity. Thereby, the sensing films would not damage the device and the operating frequencies would be still be viable as only additional sensor films are provided and a frequency shift is still being measured.

Applicant further argues that neither Pfeifer '993 or Frye '094 teach that the differing sensing film comprises sensing film materials such that said differing sensing film comprises desired response properties by mixing analyte molecules and said sensing film materials mixed in a solution in order to result a suitable formation of said

sensing film based on an interaction force selected by affinity between said sensing film and said analyte, thereby achieving said sensing film with said desired response properties. As discussed above, such a recitation is unclear and indefinitely recited. Further, the recitation appears to be drawn to an implicitly recited function of the differing sensing film. Applicant has not further limited the structure or composition of the sensing film in the recitation that follows "such that" above. The recitation also appears drawn to a method of making the sensing film, which is not afforded patentable weight within device claims. As such, the sensing films of the Pfeifer '993/Frye '094 are taken to read on such a recitation and it is also noted that such sensing films are provided for their selective binding to chemical species of interest, such that Pfeifer '993/Frye '094 form sensing films with desired response properties.

With regards to claims 5-7 rejected under 35 USC 103(a) as being unpatentable over Pfeifer '944 in view of Frye '094 **(as well as with respect to Pfeifer '993/Frye '094)** as applied to claims 1-4, 9, 15, 16, 18, 19, 21, and 23 and in further view of Tsutsumi, Applicant traverses the rejection. These arguments are moot in view of the new grounds of rejection discussed above as Tsutsumi has been removed as the reference is not needed to reject the claims. Dependent claims 5-7 do not add further structural elements or configurations so as to provide any one of the various modes described. As such, the prior art of Pfeifer '944/Frye '094(Pfeifer '993/Frye '094) includes all the structural elements and is thereby capable of the output modes described.

With regard to claim 13 rejected under 35 USC 103(a) as being unpatentable over Pfeifer '944 in view of Frye '094 **(as well as with respect to Pfeifer '993/Frye '094)** as applied to claims 1-4, 9,15, 16, 18, 19, 21, and 23 and in further view of Desu, Applicant traverses the rejection.

Applicant argues that Pfeifer '944/Frye '094 does not teach or suggest a group including all of TiN, $CoSi_2$, and WC. Examiner asserts that it is not necessary for the prior art to teach all three materials listed. Applicant's claim 13 recites,"...comprise electrode materials chosen from among the group consisting of:..". Thereby, Desu discloses TiN, and provides the motivation to modify Pfeifer '944/Frye '094 (Pfeifer '993/Frye '093) to choose TiN from the group so at to provide a conductive nitride as an electrode material known to be useful in surface acoustic wave devices.

With regard to claim 14 rejected under 35 USC 103(a) as being unpatentable over Pfeifer '944 in view of Frye '094 **(as well as with respect to Pfeifer'993/Frye'094)** as applied to claims 1-4, 9, 15, 16, 18, 19, 21, and 23 and in further view of Ueda, Applicant traverses the rejection.

Examiner refers Applicant to arguments made with respect to claim 13. Applicant's argument that the claim requires all of NiCr and CuAl to be chosen is improper. Claim 14 requires that the electrode material be chosen from among the two elements, of which Ueda discloses AlCu.

With regard to claim 22 rejected under 35 USC 103(a) as being unpatentable over Pfeifer '944 in view of Frye '094 as applied to claims 1-4, 9, 15, 16, 18, 19, 21, and

23 and in further view of Ueda, Applicant does not present an argument, other than to state what was written in the Office Action. The rejection is maintained

With regard to claim 22 rejected under 35 USC 103(a) as being unpatentable over Pfeifer '993 in view of Frye '094 as applied to claims 1-4, 9, 15, 16, 18, 19, 21, and 23 and in further view of Ueda, Applicant traverses the rejection. Applicant argues that Pfeifer '993/Frye '094/Ueda do not disclose all of the claim limitations of claim 22. Examiner argues that the combination does teach all of limitations of claim 22, as discussed above in the 103 section.

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With regards to claims 24-26 rejected under 35 USC 103(a) in various combinations of the prior art presented, Applicant traverses the rejections. As claims 24-26 have been cancelled, Applicant's arguments are moot.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NEIL TURK whose telephone number is (571)272-8914. The examiner can normally be reached on M-F, 9-630.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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NT

/Jill Warden/
Primary Examiner, Art Unit 1797